The JEFF-3.0/A Neutron Activation File - New features, validation and usage

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JEFF-3.0/A, as the ENDF-6 format conversion of EAF-2003, contains neutron-induced cross sections for 98 elements, 774 different target nuclei, including first (m) or second (n) isomeric states, from ^{1}H to ^{257}Fm. In total 12617 reactions below 20 MeV are included. As a single ENDF-6 formatted file, JEFF-3.0/A can be seamlessly used by evaluators, codes and applications worldwide. Using the data, such codes allow all the target nucleus states, the incident and emitted particles (i.e. charged particles, gas production) as well as the residual nucleus states, to be calculated as a function of time. The format chosen for the JEFF-3.0/A file uses reaction cross sections (MF-3) or cross sections (MF-10) and multiplicities (MF-9) for capture channels. This layout allows 23 open reaction channels per nucleus with the MAT numbers assigned following a strategy where the MAT for isotopes increase in steps of three, allowing for the ground and two metastable states. Having the data in ENDF-6 format allows the ENDF suite of utilities and checker codes to be used alongside many others utility, visualizing or even processing codes.

Based on the EAF activation file used for many applications from fission to fusion, including dosimetry, inventories, depletion-transmutation and geophysics; JEFF-3.0/A takes advantage of four generations of EAF files. Extensive benchmarking activities on these files provide feedback and validation from integral measurements. These, in parallel with detailed differential graphical analysis based on EXFOR have been applied, stimulating new measurements where possible and significantly increasing the quality of this activation file. The next step is to include uncertainty data for all open channels present in the file.

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